Mound City Fire

Type 6 Engine Burn Over

Facilitated Learning Analysis

October 5, 2011

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Mound City, SD, October 2011

Summary

The Mound City Fire Engine Burn Over Facilitated Learning Analysis (FLA) was requested by the Division Director, South Dakota Department of Agriculture, Wildland Fire Suppression Division to learn what occurred on the Mound City Fire on October 5, 2011.

The Fire was located 2 miles southwest of Mound City, SD and was burning in varied terrain with natural and crop fuels. The fire was primarily wind driven with unseasonably warm temperatures and low relative humidity adding to the extreme fire behavior conditions.

On the afternoon of October 5, 2011 while engine crew members were attempting to cut an access through a barbed wire fence, a sudden increase in fire behavior and slight change of fire direction caused a two person engine crew to abandon their vehicle and evacuate the fire area by jumping onto another engine avoiding any injury to firefighter personnel. During this event a type 6 engine was burned over and was totally destroyed. The firefighter's decisions and Fire Department policy resulted in a positive outcome for the engine crew involved in this incident.

Weather

Weather in the Mound City area was unseasonably warm for the time of year. A 24 hour low temperature of 68° F to a mid-afternoon high temperature of 84.9° F recorded at the Mobridge, SD Airport 20 miles to the west of the fire area.

Winds were from the south to the southeast for most of the day with wind speeds from 18 to 30 mph. Maximum wind gust of 43 mph was recorded.

Relative humidity for the 24 hour period ranged from 19% to 41%.

At the time of the burn over weather in the fire area was temperature 85° F, Relative Humidity 20% with winds around 28 mph with wind gusts to 42mph. Reports of wind gusts of up to 60 mph were reported from other fires in the area.

Fuels

The Mound City Fire area holds grass, brush and timber fuel models. The grass fuel models consist of prairie grass, alfalfa fields and wheat stubble. Brush Fuel Models were present in the creek bottoms, draws and river breaks. Also mature cured cornfields and sunflower fields were prevalent in the fire area. Timber fuel models consisted of hardwoods in the creek bottoms and man-made wind breaks as well as cedar trees on the slopes coming off of the creek bottoms and river breaks.

It should be noted that no-till farming practices were used in the area of the burn over. This practice is used to conserve equipment fuel costs as well as for soil conservation. In a no-till area wheat is often harvested using a combine clipper head that cuts the wheat off just below the head leaving a stubble field of 24 inches or more after the harvest. The following season, corn is then planted in the wheat stubble. When the corn has grown above 24 inches in height, there is still cured wheat stubble available as fuel in an understory. It was noted that there were several areas of the Mound City Fire that the fire burned through the wheat stubble understory basically being camouflaged by the mature corn fields.

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Topography

The Mound City Fire area lies to the East of the Missouri River and terrain varies widely. Farm fields and pastures consist of rolling terrain. Wooded areas are located in rolling terrain and in river breaks that have slopes as great as 30% in some areas. The river breaks, draws and creek bottoms were significant enough to have an effect on the wind when in proper alignment.

Narrative

At 14:10hrs on the afternoon of October 5, 2011 the Campbell County, SD Emergency Manager requested Mutual Aid response from the surrounding Counties when the wind driven Mound City Fire was unable to be controlled by local resources. There was a lack of local resources on this day due to multiple fire starts in Campbell County and surrounding areas. At 14:35hrs engines from a neighboring Fire Department in Walworth County arrived on the scene. Two engines (Type6/ Type3) were briefed by the Incident Commander and were assigned to the west flank of the fire.

Due to heavy smoke conditions and the fact that the ICP/Staging Area was actually located north (in front of) the head of the fire, the two engines soon realized they were actually attacking the fire from the west shoulder of the fire near the head.

The two Fire Department engines decided that they needed to move further to the south so that they could anchor and flank closer to the heel of the fire. The access to the south, towards the heel of the fire, was blocked by a barbed wire fence. The Type 6 engine stopped in an area along the fence that was several hundred feet away from the west shoulder of the on-coming fire, which was showing 12 inch flame lengths at the time, to cut an access through the barbed wire fence.

At approximately 15:15hrs, after both engine crew members worked together to cut an access through the barbed wire fence, they looked back toward their engine and noticed that the fire behavior had increased (6 foot flame lengths) and the fire was moving at a high rate of speed toward their Type 6 engine. The engine operator remembered that the windows were down on the vehicle and from previous experience knew that with the windows down, there was not

enough protection from wind driven heat and smoke to be able to reach the engine and get it moved before the flame front reached the vehicle. The engine operator then directed his crew member to run for the Type 3 engine they had been working in tandem with, both crew members jumping onto the Type 3 engine and escaping the flames without injury.

The Four Fire Department crewmembers continued to work the west flank of the fire on the Type 3 engine until it was realized that their efforts were futile and they had to pull off of the flank of the fire and resort to an indirect attack method using farm disk equipment to create wide fire lines ahead of the fire. The engine crew supported the disk lines and monitored for spot fires until the head of the fire had completely engaged the disked area and the fires forward progress had been stopped.

After returning to the area of their Type 6 engine, fire crews found the Type 6 engine had been totally destroyed by the fire.

Lessons Learned:

The most important lesson that can be learned from this burn over is the simple fact that the Fire Department involved has a policy in place where they attack the fire in pairs/tandem. If the Type 3 engine had not been in the immediate area both the firefighters involved may have received serious burn injuries or may have been killed by the fast approaching fire. This is a good solid policy for a Fire Department or any agency to have in place.

Firefighters were in full nomex pants, shirts, leather lace-up lug sole boots and leather gloves. Full PPE in serviceable condition. However there were no fire shelters available to the firefighters. Fortunately in this case the fire shelters were not needed.

The two Fire Department engines were briefed at an ICP/Staging Area which was located in front of the on-coming fire. When the IC asked the engines to deploy on the west flank of the fire, they entered the fire area in a position that put them in front of the west shoulder at the head of the fire. ICP/Staging should be located outside of the fire area.

Contributing Factors

Fuels

The no-till crop conservation methods used in the area greatly influenced the firefighter's perceptions of the fire behavior in this incident. Having a dead fuel moisture fuel bed of 24" to 30" wheat stubble as an understory in a mature corn field caused serious control problems on this fire. There were times when the fire would advance through the wheat stubble understory and camouflage the fire behavior in the mature corn. The fire would spread up into the corn canopy greatly increasing the fire behavior in some areas.

Terrain

There was a wide drainage to the southeast of where Type 6 engine was burned over. It is believed that a slight southeast shift in the wind caused the head of the fire to climb the slope of the drainage at a higher rate of spread and closed the distance between the Type 6 engine and the head of the fire in a very short period of time.

LCES

The high winds and heavy smoke conditions made having a lookout ineffective. At times the firefighter's reported that they could not see the fire due to the smoke. Communications were limited to the local digital command channel only. This channel was obviously overwhelmed by the radio traffic and would have been ineffective for emergency communications.

Recommendations

In this incident, a policy of running engines in pairs or in tandem saved lives. It is recommended that all Fire Departments and agencies follow this policy when fighting fires in the grass and crop fuel models.

All Fire Departments and agencies that have wildland fire responsibilities should provide adequate fire shelters for all members of their agency.

ICP/Staging areas should be located at the heel of the fire in a safe area. It is easier for the incoming briefings, if the firefighter's can see the fire from a point that is not affected by smoke. This allows the firefighter's to develop their plan of attack and their approach to the fire from a safe point.

Attack from the Black. Range and grassland fires should be attacked from the inside the flame front with the vehicles and personnel in an area of already burned fuels whenever possible. If you cannot attack from the black, then a different strategy such as indirect attack should be considered.

The incident command system should be used on all fires. This fire was large enough that the span of control should have had at least two divisions and possibly a Tender group with supervisors.

Fire Department members need to be trained in the basic use of the radios. Tactical channels need to be assigned and used. Using the County dispatch channel for all communications allow the channel to be overwhelmed and if there are any other emerging incidents in the County, the channel is almost useless for any other actions.

A fire behavior bulletin needs to be developed and distributed in areas where no-till farming practices are in use. The fire behavior on this fire was greatly influenced by the fire burning through the wheat stubble understory in mature corn fields. The fire rate of spread and direction was hidden at times by the mature corn canopy.

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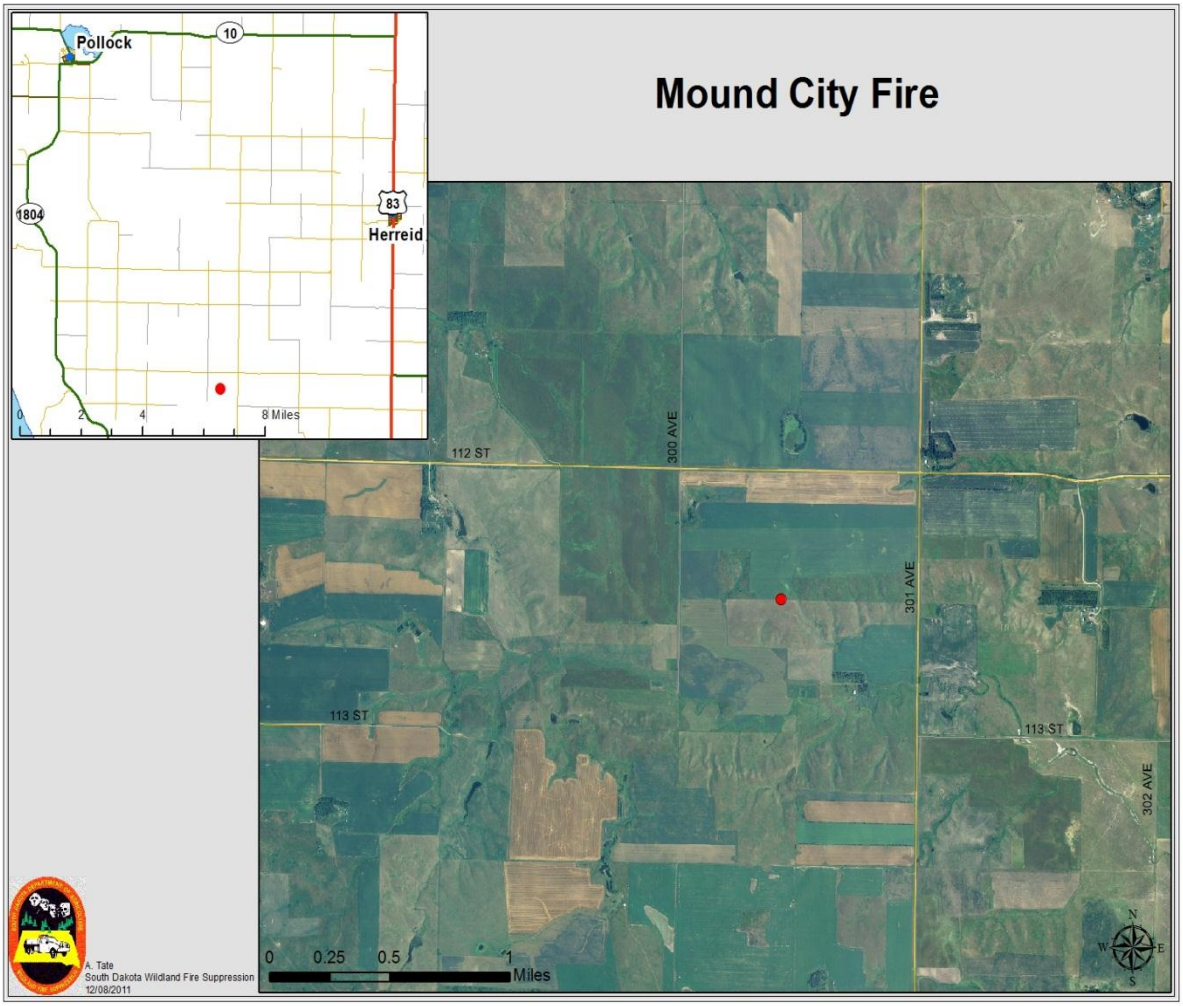

Map indicating the location of the Type 6 Engine Burn over.

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Type 3 and Type 6 engine working in Tandem. **Notice: all firefighters were wearing full PPE**

Photo courtesy of the Prairie Pioneer.

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Fire Behavior on the northwest flank/shoulder of the fire prior to the burn over.

Photo courtesy of the Prairie Pioneer.

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Drainage just east of the burn over site which added to the increase of fire behavior.

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Burn over site. Looking from north to south.

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Corn stubble with a wheat stubble understory. Multi-layered fuel bed.

No-till farming practice. Residual wheat stubble after harvest.

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